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DRAWINGS ATTACHED

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(54) ROTOR FOR A FLAIL MOWER

(71) We, BLACKSTONE & COMPANY LIMITED, a British Company, of Rutland Engineering Works, Stamford, Lincolnshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a rotor for use with a flail mower or like cutter in which flails are employed for cutting or chopping operations.

The flails of flail mowers become blunted or broken during use and have to be shapened or replaced from time to time. In view of the multiplicity of flails normally employed on such machines it may be a time-consuming operation removing the flails if, as hitherto, each flail has its own individual fixing means.

An object of the invention is to provide a rotor having provision for several flails to be detachable from the rotor by release of a single securing means.

A further object of the invention is to provide a rotor which is of rigid construction but which occupies relatively little space.

According to one aspect the invention provides a rotor for a flail mower comprising, at least two parallel elongate members arranged for rotation about a common axis extending parallel to the members, flails to be pivotally and releasably supported on each of the members, and securing means associated with each of said members, the securing means extending alongside each member and serving to secure the flails associated with each member to said member.

Preferably the rotor further comprises a central shaft having its major axis at said axis of rotation and the elongate members being equiangularly-spaced around the shaft.

The said members may be fixed to the rotor and the securing means may extend parallel to said members and be removable from the rotor in their lengthwise direction.

The securing means are conveniently each a rod, which is located adjacent but spaced from the associated elongate member so as to locate the shank of a flail between the rod and the associated member.

The shank of each flail may be formed with an open loop in which a member is to be located when the flail is in an operating position on the rotor.

When the flails are in position on the rotor and are secured by said securing means they may be pivotable from a substantially radially-directed position with respect to the rotor axis to a position in which the flails are directed rearwardly with respect to the direction of rotation of the rotor. Preferably the elongate members are cylindrical tubes.

The elongate members may be held in position by axially-spaced flanges.

Preferably the securing means pass slidably through said flanges.

The securing means may be lockable on the rotor by releasable locking means.

The locking means may comprise a locking member arranged to engage a groove in the securing means, the locking member being securable in locking engagement with the securing means.

The flails may be arranged to overlap one another in the circumferential direction and are arranged along helical paths about the rotor.

Preferably the flail is in the form of a plate having an outer cutting edge arranged to be parallel to the axis of rotation of the rotor.

Further features of the invention appear from the following description of an embodiment of the invention given by way of example and with reference to the drawings accompanying provisional specification, in which:—

Figure 1 is a side elevation of a rotor;

Figure 2 is a side elevation of part of the rotor of Figure 1 showing a flail;

Figure 3 is a sectional end elevation showing flails in various positions, and

Figure 4 is a side elevation of an alternative form of flail.

Referring to the drawings a rotor for a flail mower is shown. The flail mower has a

[*Price 25p*]

drive transmission (not shown), which is of known form, and which may be arranged to be driven from the power take off shaft of an agricultural tractor by which the mower is to be hauled. The parts of the flail mower not shown do not constitute any part of the present invention and will be apparent to those skilled in the art and they will not therefore be described further.

The rotor is made up of a central tubular shaft 10 having at one end a stub shaft 11 for location in a bearing (not shown), and at the other end a stub shaft 12 with a key way 13 arranged to be located in a further bearing (not shown) and to be in driven engagement with the drive transmission.

The tubular shaft 10 passes through and is welded to a plurality of annular flanges 14 which are axially spaced along the shaft 10. A flange 14 is located at each end of the shaft 10 and other flanges 14 are equally spaced between the two end flanges. In operation the shaft 10 has its axis horizontal and transverse to the direction of travel of the mower, and the rotor is rotated about the axis of the shaft 10.

The rotor also includes four elongate members or cylindrical tubes 15 parallel to the shaft 10 and equiangularly-spaced about the axis of the shaft 10 on a notional cylinder concentric with the shaft 10. The tubes 15 each pass through apertures in the flanges 14 and are welded to each flange.

Spacer washers 16 are located on each of the tubes 15 midway between alternate pairs of flanges 14 for location of flails 17. The flails 17 are located on the tubes 15 as seen in Figures 2 and 3, in pairs so that between each adjacent pair of flanges 14 are two flails 17 on the tubes 15 on opposite sides of the shaft 10. Between the next adjacent pair of flanges the flails 17 are on the other two tubes 15 so that on each tube a flail is located between alternate successive adjacent pairs of flanges. In this way one flail acts for each increment of length of the rotor, one increment constituting the distance between a spacer 16 and an adjacent flange 14. The arrangement of flails also means that the flails are located about a helical path around the rotor.

The rotor further includes four cylindrical rods 18 each located parallel and adjacent a tube 15. The rods 18 serve as securing means for the flails on the associated tubes, and the rods 18 pass slidably through apertures 19 in the flanges 14 from one end of the rotor to the other. The rods 18 are removable by pulling the rods in the axial direction of the rotor through the flanges, and in the operative position of the rotor the rods are each locked in position by a locking device comprising a rectangular apertured plate 20 which engages a groove 21 formed in the rods 18. The plates 20 are held in engagement with the grooves 21 by bolts 22 which pass through apertures 23 in the flanges 14 and are held in place by nuts 24.

Bearings for the flails 17 are in the form of flexible nylon sleeves 25 which are part-cylindrical and can be readily fitted over the tubes 15.

The flails 17 are in the form of plates each having a shank portion 26 and a blade portion 27. The shank portion 26 is bent over to form an open loop of part-cylindrical form which is a close fit on the sleeve 25. The free end 28 of the loop diverges slightly from the opposite side of the loop so as to readily admit the tube into the loop and enable the flail to be removed from and attached to the tube 15. When the rods 18 are in position on the rotor the flails cannot be removed but when the rods 18 are removed the flails are readily detachable from the tubes 15. When the flails are held on the tubes by the rods 18 the flails are free to pivot about the tubes from the position shown by 17a to the position shown by 17b in Figure 3. The rotor is arranged to rotate in the direction indicated by arrow X in Figure 3 so it will be appreciated that 17a indicates the rearmost position of a flail in which the end 28 of the shank engages the shaft 10, and 17b indicates the most forward position of the flail when the flail contacts the associated rod 18. The flail indicated by 17c in Figure 3 is in the normal position of operation and is directed generally radially of the axis of the shaft 10.

The flail blade portion 27 is formed with the radially outer end bent forwardly of the direction of rotation to give the most effective cutting action of the cutting edge 29 of the flail whilst at the same time the cutting edge 29 normally lies on a radius from the axis of rotation of the rotor passing through the pivot axis of the flail. The cutting edge 29 lies parallel to the axis of rotation of the rotor.

The flails 17 are arranged to have the cutting edges of adjacent flails overlapping in order to avoid gaps being left between adjacent flails. In order to achieve overlapping of the cutting edges 29 some of the flails are of the shape shown in Figure 2 with straight side edges, and some of the flails have a stepped side edge as shown in Figure 4. In the latter form of flail the blade portion 27 extends across part of the path of travel of the blade portion of the adjacent flail. Other flails are as shown in Figure 4 but with the opposite side edge of stepped form. By locating the appropriate flails in the appropriate places on the rotor it can be ensured that the flails overlap and cut an even surface during operation.

It will be appreciated that although in the specific embodiment of the invention the rotor is described as having a central shaft, in an

alternative arrangement this shaft can be omitted. Furthermore the rods 18 can be omitted and the tubes 15 made removable to detach the flails. In the latter arrangement the flails may have a shank portion having a closed loop for location around the tubes and the tubes would each be secured by removable securing means.

The construction of the rotor described enables a compact rotor to be used and the rotor to be employed with a mower of reduced dimensions as compared with existing flail mowers. The flails may be readily detached for sharpening or replacement.

WHAT WE CLAIM IS:—

1. A rotor for a flail mower comprises, at least two parallel elongate members arranged for rotation about a common axis extending parallel to the members, flails to be pivotally and releasably supported on each of the members, and securing means associated with each of said members, the securing means extending alongside each member and serving to secure the flails associated with each member to said member.

2. A rotor according to Claim 1 comprising a central shaft having its major axis at said axis of rotation and the elongate members being equiangularly-spaced about the shaft.

3. A rotor according to Claim 1 or 2 wherein the elongate members are fixed to the rotor and the securing means extend parallel to said members and are removable from the rotor in their lengthwise direction.

4. A rotor according to Claim 3 wherein the securing means are each a rod which is located adjacent but spaced from the associated elongate member so as to locate the shank of a flail between the rod and the associated member.

5. A rotor according to any one of the preceding claims wherein the flails each have a shank which is in the form of an open loop in which loop an elongate member is to be located when the flail is in an operating position on the rotor.

6. A rotor according to any one of the preceding claims wherein the flails, when in an operating position on the rotor, are pivotable from a substantially radially-directed position with respect to the rotor axis to a position in which the flails are directed rearwardly with respect to the direction of rotation of the rotor.

7. A rotor according to any one of the preceding claims wherein the elongate members are cylindrical tubes.

8. A rotor according to any one of the preceding claims wherein the elongate members are held in position by axially-spaced flanges.

9. A rotor according to Claim 8 wherein the securing means pass slidably through said flanges.

10. A rotor according to any one of the preceding claims wherein the securing means are lockable on the rotor by releasable locking means.

11. A rotor according to Claim 10 wherein the locking means comprises a locking member arranged to engage a groove in the securing means, the locking member being securable in locking engagement with the securing means.

12. A rotor according to any one of the preceding claims wherein the flails are arranged to overlap one another in the circumferential direction and are arranged along helical paths about the rotor.

13. A rotor for a flail mower substantially as described with reference to the drawings accompanying the provisional specification.

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1256554 PROVISIONAL SPECIFICATION
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Sheet 1

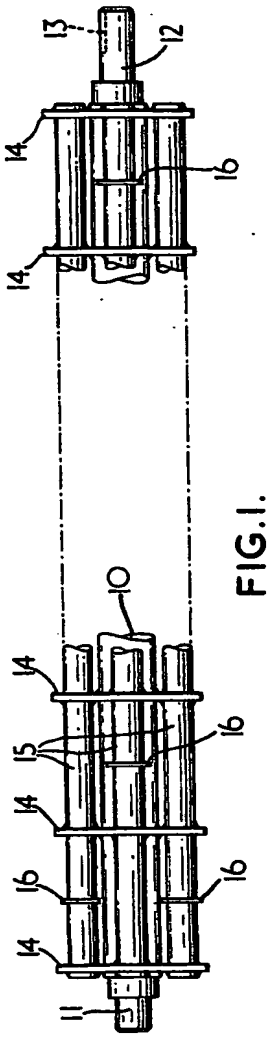
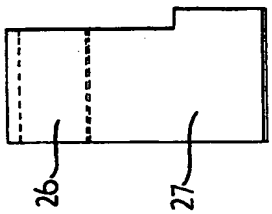


FIG. 1.

FIG. 4.



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Sheet 2

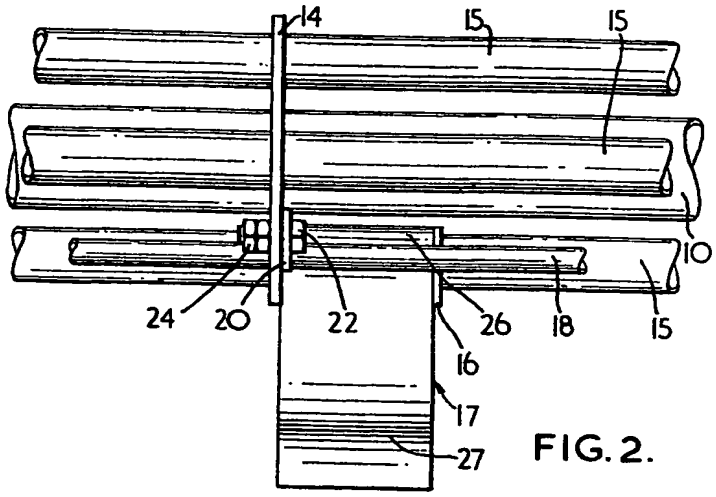

FIG. 2.

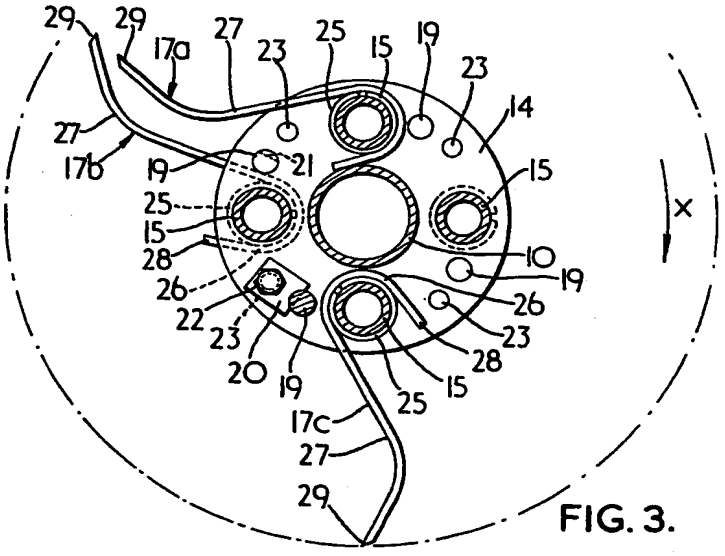

FIG. 3.